Supporting the NSF Big Ideas



rcsb.org

RCSB PDB is

Harnessing Data for 21st Century Science and Engineering

Enabling research across all NSF directorates from agriculture to zoology



The mechanisms of molecular evolution are revealed in globin sequences and structures in the PDB

Supporting educational pathways

Outreach and education efforts are built to broaden access and engagement with biomolecules

Accelerating dataintensive research through advanced cyberinfrastructure



APIs provide access to experimental and comparative data to sustain a wide range of biological resources



RCSB PDB Informs our Understanding the Rules of Life: Predicting Phenotype

Addressing fundamental questions in the life sciences

Together, hundreds of nucleosome structures in the PDB help explain how DNA is reversibly packaged in the cell



Crossing different length scales

The multi-scale, multi-state, time evolving structures from Integrative/ Hybrid Methods illustrate Biology in 4D, allowing us to see the nuclear pore from atoms to large molecular assemblies

Forecasting changes in biological systems



Real-time structural biology by SFX/XFEL reveals atomic-level mechanisms of molecular signaling

Generating broadly generalizable results beyond structural biology

PDB archive is the gold-standard training data set. Enumeration of stable fold space has revolutionized protein structure and function prediction, connecting genotype to phenotype.



Value for NSF

- RCSB PDB safeguards structural biology data generated with NSF funding:
 - » Nearly half a billion dollars worth of NSF data over the lifetime of the PDB
- PDB structures have contributed data to nearly 1 million published research papers
- PDB data enable
 - » Research in subject areas from Agriculture to Zoology
 - Enable interdisciplinary collaborations and accelerate methods development by highly visible collaborative networks (CASP, Rosetta, folded, Eterna)
- PDB data are heavily used to understand Fundamental Biology
 - » DNA packing into nucleosomes and chromatin
 - » Light signaling in plants
 - » Protein folding and engineering of novel enzymes for pollutant bioremediation